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Entrepreneurial Ecosystems¹

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1. Introduction

In recent years the fields of entrepreneurship studies, economic geography, urban economics, and the economics of entrepreneurship have moved closer to each other through research on the context of entrepreneurship (Ucbasaran et al., 2001; Welter, 2011; Zahra et al., 2014; Autio et al., 2014), the growing recognition that not all types of entrepreneurship are equally important for economic growth (Henrekson & Sanandaji, 2014; Stam et al., 2009; 2011; Wong et al., 2005), and the increasing interest in the entrepreneurial actor within urban and regional economics (Acs & Armington, 2004; Feldman, 2001; Glaeser et al., 2010). These developments have culminated in an emerging entrepreneurial ecosystem approach that explicitly focuses on how urban and regional contexts affect ambitious entrepreneurship. In this chapter we will review and discuss this emergent entrepreneurial ecosystem approach. We define entrepreneurial ecosystems as *a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory*. We see productive entrepreneurship (Baumol, 1990) as an outcome of successful ambitious entrepreneurship. Ambitious entrepreneurs are individuals exploring opportunities to discover and evaluate new goods and services and exploit them in order to add as much value as possible (Stam et al., 2012). That means more than just 'being your own boss' or 'pursuing self-fulfilment' through business ownership, ambitious entrepreneurs attach importance to the performance and success of their ventures and seek to quickly scale up (Stam et al., 2012). In practice ambitious entrepreneurs are more likely to achieve substantial firm growth, innovation or internationalization than the 'average' entrepreneur.

Though recent interest in entrepreneurial ecosystems amongst academic researchers is driven by its popularity with policymakers and entrepreneurs, it is part of a larger trend in entrepreneurship studies. The fundamental ideas behind entrepreneurial ecosystems were first developed in the 1980s and 1990s as part of a shift in entrepreneurship studies away from individualistic, personality-based research towards a broader perspective that incorporated the role of social, cultural, and economic forces in the entrepreneurship process (Dodd & Anderson, 2007). This was part of a wider movement away from conceptions of the entrepreneur as a solitary Schumpeterian 'economic superman' and towards a more nuanced view of entrepreneurship as a social process embedded in broader contexts (Nijkamp, 2003; Steyaert & Katz, 2004). In particular, the place that entrepreneurship takes within is seen as having a crucial impact over the entire entrepreneurship process, from the ability and willingness of nascent entrepreneurs to start a firm to their ability to find venture capital and eventually structure an exit from the firm. Works by Pennings (1982), Dubini (1989), Van de Ven (1993) and Bahrami and Evans (1995) developed the concept of an 'entrepreneurial environment' or ecosystem in order to explain the influence regional economic and social factors have over the entrepreneurship process. Building on previous movements that decentered the individual entrepreneur as the sole locus of value creation, the new contextual turn emphasizes the importance of situating the entrepreneurial phenomenon in a broader field that incorporates temporal, spatial, social, organizational, and market dimensions of context (Zahra, 2007; Zahra et al., 2014). While the past decade has seen entrepreneurship researchers become more sensitive to some contexts such as location, too often context is "taken for granted, its influence underappreciated or...controlled away" (Welter, 2011: 173-174). That is, previous work in entrepreneurship has tended to attempt to eliminate the role of context in order to produce generalizable models of entrepreneurial activity when instead context should be the specific focus of investigation. A context such as location should not be treated as a simple control variable or proxy; a deeper examination of how the cultural, social, political, and economic structures and processes associated with a place influence all aspects of the entrepreneurial journey is required. A context like location is not a *cause* of particular entrepreneurial practices but rather reflects a much more complex influence on entrepreneurship (Johannisson, 2011).

The purpose of this chapter is to critically investigate the emerging literature on entrepreneurial ecosystems. Current work on ecosystems is underdeveloped, focusing more on

¹ This chapter is partly based on Stam (2015)

superficial generalizations based on successful case studies such as Silicon Valley or Boulder, Colorado rather than on rigorous social science research. The next section provides a review of the multiple definitions of ecosystems found within the literature. Next, we discuss the relationships between ecosystems and allied concepts such as industrial districts, clusters, and innovation systems. The chapter concludes by discussing an integrative model that connects the functional attributes of entrepreneurial ecosystems with entrepreneurial outputs and welfare outcomes.

2. The entrepreneurial ecosystem defined

The concept of entrepreneurial ecosystems has gained popularity in recent years due to mainstream business books such as Feld's (2012) *Startup Communities* and work by Isenberg (2010) in the *Harvard Business Review*. These works have popularized the idea amongst entrepreneurial leaders and policymakers that a place's community and culture can have a significant impact on the entrepreneurship process. But despite its popularity, there is not yet a widely shared definition of entrepreneurial ecosystems amongst researchers or practitioners. The first component of the term is *entrepreneurial*: a process in which opportunities for creating new goods and services are explored, evaluated and exploited (Schumpeter, 1934; Shane & Venkataraman, 2000). The entrepreneurial ecosystem approach often narrows this entrepreneurship down to 'high-growth start-ups' or 'scale-ups', claiming that this type of entrepreneurship is an important source of innovation, productivity growth, and employment (World Economic Forum, 2013; Mason and Brown, 2014). Empirically, this claim seems too exclusive: networks of innovative start-ups or entrepreneurial employees can also be forms of productive entrepreneurship (Baumol, 1990) and in that way the source of earlier mentioned welfare outcomes. But it is clear that the entrepreneurial ecosystem approach does not by definition include the traditional statistical indicators of entrepreneurship, such as 'self-employment' or 'small businesses' into entrepreneurship. This distinction between the traditional measures of entrepreneurship and the conceptually more adequate measures of entrepreneurship such as innovative and growth-oriented entrepreneurship, is increasingly emphasized in the entrepreneurship literature (Shane, 2009; Stam et al., 2012; Mason & Brown, 2013; Henrekson & Sanandaji, 2014).

The second component of the term is *ecosystem*. The biological interpretation of this concept in which the interaction of living organisms with their physical environment is at the centre is obviously not to be taken too literally. Rather, the entrepreneurial ecosystem approach emphasizes that entrepreneurship takes place in a community of interdependent actors (cf. Freeman & Audia, 2006). In particular the literature on entrepreneurial ecosystems focuses on the role of the (social) context in allowing or restricting entrepreneurship and in that sense is closely connected to other recent 'systems of entrepreneurship' or systemic entrepreneurship research approaches (Neck et al., 2004; Sternberg, 2007; Ylinenpää, 2009; Acs et al., 2014), which often aim to bridge the innovation system approach and entrepreneurship studies. Unlike previous uses of the term 'ecosystem' in the management literature such as by Moore (1993) and Iansiti and Levien (2004) that focus on the organization of a single industry or value chain, entrepreneurial ecosystems are an inherently geographic perspective. That is to say, entrepreneurial ecosystems focus on the cultures, institutions, and networks that build up within a region over time rather than the emergence of order within global markets.

Entrepreneurial activity, as an *output* of the entrepreneurial ecosystem, is considered the process by which individuals create opportunities for innovation. This innovation will eventually lead to new value in society and this is therefore the ultimate *outcome* of an entrepreneurial ecosystem while entrepreneurial activity is a more intermediary *output* of the system. This entrepreneurial activity has many manifestations, such as innovative start-ups, high-growth start-ups, and entrepreneurial employees (Stam, 2014). Especially entrepreneurial employees seem to be of great importance for new value creation in developed economies like Europe (Bosma et al., 2012; Stam, 2013; Bosma et al., 2014). The term productive entrepreneurship refers to "any entrepreneurial activity that contributes directly or indirectly to net output of the economy or to the capacity to produce additional output" (Baumol, 1993 p. 30); which we interpret as entrepreneurial activity that creates aggregate welfare increases. Productive entrepreneurship might also include failed enterprises that have provided a fertile breeding ground for subsequent ventures or inspired them, creating net social value ('catalyst ventures': Davidsson, 2005). Technically speaking this means that the total

(social) value created by entrepreneurial activity should be more than the sum of the (private) value created for the individual entrepreneurs (leaving distributional issues aside).

While work on entrepreneurial ecosystems is still in its infancy there are already several empirical studies showing how a rich entrepreneurial ecosystem enables entrepreneurship and subsequent value creation at the regional level (Fritsch, 2013; Tsvetkova, 2015). For example, Mack and Mayer (2016) explore how early entrepreneurial successes in Phoenix, Arizona has contributed to a persistently strong entrepreneurial ecosystem based on visible success stories, a strong entrepreneurial culture, and supportive public policies. Similarly, Spiegel's (2015) study of entrepreneurial ecosystems in Waterloo and Calgary, Canada suggests that while ecosystems can have different structures and origins, their success lies in their ability to create a cohesive social and economic system that supports the creation and growth of new ventures. Other work on regions such as Silicon Valley (Saxenian, 1994; Kenney and Patton, 2005), Washington DC (Feldman, 2001) and Kyoto (Aoyama, 2009) — even if not using the precise term 'entrepreneurial ecosystem' — described how interlocking historically produced, place-based elements created the conditions for long-term entrepreneurial success. Works such as Acs et al. (2014) have employed large scale quantitative methods, rather than qualitative case studies, to identify strong entrepreneurial ecosystems and show the different underlying local factors associated with high levels of innovative entrepreneurship.

3. Predecessors to the entrepreneurial ecosystem approach

What the entrepreneurial ecosystem approach has in common with other established concepts - such as industrial districts, clusters, and innovation systems – is the focus on the external business environment: that there are forces beyond the boundaries of an organization but within those of a region that can contribute to a firm's overall competitiveness (see table 1). The industrial district approach emphasizes the local division of labour of an industry (Marshall, 1920) and the interaction between the community of people and a population of firms within a socio-territorial entity (Becattini, 1990) in order to be successful on international markets. The cluster approach focuses on 'geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (...) in particular fields that compete but also co-operate' (Porter, 1998: 197). Regional innovation systems (RIS) refer to the networks and institutions linking knowledge producing hubs such as universities and public research labs within a region and innovative firms. These linkages allow knowledge to spill over between different organizations, increasing a region's overall innovativeness (Cooke et al., 1997).

The entrepreneurial ecosystem approach differs from industrial district, cluster, and innovation system approaches by the fact that the entrepreneur, rather than the firm, is the focal point of analysis. The entrepreneurial ecosystem approach thus begins with the entrepreneurial individual instead of the company but also emphasizes the role of the social and economic context surrounding the entrepreneurial process. Most cluster studies focus on firms and industries, including their dynamics (Frenken et al. 2015). As opposed to the clusters, district, and innovation systems literature, the focus of ecosystems research is placed firmly on the entrepreneur and the startup rather than larger, more established firms or slower growing SMEs. The high-growth startups that make up the basis of entrepreneurial ecosystems are not necessarily included in all cluster and industrial district models (Markusen, 1996). While frameworks of industrial districts, clusters, and innovation systems do include a role for entrepreneurs (e.g. Henry & Pinch 2000; Cooke 2001; Ylinepää 2009), the focus is not specifically on them but rather the role of entrepreneurs and startups within larger systems of value creation and innovation. As a result, these existing approaches often see startups as smaller versions of larger, international firms rather than as unique organizational entities with different (and often more constrained) capabilities and resources.

Table 1. Comparison with industrial district, cluster, and innovation system literature

	Key actors	Key concepts	Input into Entrepreneurial Ecosystem approach	Key outcome	Key references	Key references entrepreneurship
Marshallian industrial district	SMEs	Labor market pooling; specialized goods and services; knowledge spillovers; market competition	Talent (labor market pooling), intermediate services (specialized goods and services), knowledge (spillovers)	Regional economic growth (productivity)	Marshall 1890; Krugman 1991; Markusen 1996	-
Italianate Industrial district	SMEs; local government	Flexible specialization, interfirm cooperation, trust (social embeddedness)	Networks between entrepreneurs and enterprises	Regional economic growth (employment)	Piore & Sabel 1984; Becattini 1990; Harrison 1992	Johannisson et al. 1994; Malecki 1997; Lazerson & Lorenzoni 1999
Cluster	Innovative firms	Factor conditions; demand conditions; related and supporting industries; firm structure, strategy and rivalry	Talent, finance, knowledge, physical infrastructure (factor conditions); demand (demand); support services / intermediaries (related and supporting industries); ...	National / regional competitiveness (productivity of particular industries)	Porter 1990; 1998	Rocha 2004; Rocha & Sternberg 2005; Delgado et al. 2010
Innovation system	Innovative firms; national government	Networks, inter-organizational learning, system	Knowledge, finance, formal institutions, demand	Innovation	Freeman 1987; Lundvall 1992; Braczyk et al 1998	Sternberg 2007; Ylinenpää 2009

Beyond this, the role of knowledge differs between ecosystems and allied concepts like clusters and innovation systems. Within traditional models knowledge refers to the technical know-how necessary to develop new products and technologies and the market knowledge necessary to know which new products will succeed in the marketplace (see Cooke, 2001). This knowledge is key in ecosystems, but ecosystems approaches also highlight a new type of knowledge: knowledge about the entrepreneurship process itself. This includes knowledge about the challenges facing entrepreneurs as they scale, how to design business plans and pitch ideas to angel investors and venture capitalists, and how to overcome the liability of newness when working with potential clients and suppliers. Thus, the mentoring and networking between entrepreneurs are critical to sharing entrepreneurial knowledge within an ecosystem (Lafuente et al. 2007).

Another significant contrast with other concepts is that the entrepreneurial ecosystem approach not only sees entrepreneurship as a result of the system, but also sees the importance of entrepreneurs as central players (leaders) in the creation of the system and in keeping the system healthy (Feldman, 2014). This “privatization” of entrepreneurship policy diminishes the role of the state compared with previous policy approaches. However, this does not remove its role but rather shifts it to that of a 'feeder' of the ecosystem than as a 'leader' (Feld, 2012). Entrepreneurs with a long-term commitment to the ecosystem are often best positioned to recognize the opportunities and restrictions of the ecosystem and to deal with them together with other 'feeders' of the ecosystem (such as professional service providers and the financial infrastructure). These successful businesspeople and philanthropists can act as 'dealmakers,' using their own social networks and capital to improve the entrepreneurial environment of their home region (Feldman and Zoller, 2014). However, the government retains an important role as a 'feeder' who acts to create a conducive economic and social environment for entrepreneurship, for example in adjusting laws and regulations or providing training and educational opportunities. Market failures and system failures are not necessarily rationales for government intervention: even here, entrepreneurs can find opportunities, for example by reducing information asymmetry and organizing collective action to create public goods.

Table 2. Differences and similarities between entrepreneurial ecosystems and related concepts

Approach	Industrial District, Cluster, Innovation System	Entrepreneurial Ecosystem
Main focus	Main focus is on economic and social structures of a place that influence overall innovation and firm competitiveness. In many cases, little distinction made between (fast growing) startups and other types of organizations.	Startups explicitly at centre of ecosystem. Seen as distinct from established large firms and (lower-growth) SMEs in terms of conceptual development and policy formation.
Role of knowledge	Focus on knowledge as source of new technological and market insights. Knowledge from multiple sources is recombined to increase firm competitiveness. Knowledge spillovers from universities and other large research intensive organizations are crucial.	In addition to market and technical knowledge, entrepreneurial knowledge is crucial. Knowledge about the entrepreneurship process is shared between entrepreneurs and mentors through informal social networks, entrepreneurship organizations, and training courses offered.
Locus of action	Private firms and state is primary locus of action in building and maintaining industrial district/cluster/innovation system. Little room for individual agency in their creation.	Entrepreneur is the core actor in building and sustaining the ecosystem. While state and other sources might support ecosystem through public investment, entrepreneurs retain agency to develop and lead the ecosystem.

As illustrated in Table 2, there are significant differences between entrepreneurial ecosystems and allied concepts such as industrial districts, clusters, and innovation systems. This does not mean that work on ecosystems cannot draw on the decades of research underlying these concepts, but that the findings from this work must be reinterpreted through the agent-centred approach that is at the heart of the entrepreneurial ecosystem approach.

4. Attributes of successful entrepreneurial ecosystems

The recent popular literature on entrepreneurial ecosystems is directly aimed at the key stakeholders of the ecosystem, mainly entrepreneurial leaders and policymakers rather than an academic audience. The recent entrepreneurial ecosystem literature provides several lists of factors which are deemed to be important for the success of an entrepreneurial ecosystem. Naturally, entrepreneurs (being visible and connected) are considered to be the heart of a successful ecosystem, but successful entrepreneurial ecosystems have multiple attributes (Feld, 2012: 186-187). Next to the key role of entrepreneurs themselves (in leading the development of the ecosystem and as mentors or advisors) the nine attributes by Feld (2012) emphasize the interaction between the players in the ecosystem (with high network density, many connecting events, and large companies collaborating with local start-ups) and access to all kind of relevant resources (talent, services, capital), with an enabling role of government at the background.

An important input is a broad, deep talent pool of employees in all sectors and areas of expertise. This includes both technical workers as well as more business-oriented workers such as salespeople, marketers, and business development professionals. Universities are an excellent resource for start-up talent and should be well connected to the community. Next to human capital, financial capital is key: a strong, dense, and supportive community of VCs, business angels, seed investors, and other forms of financing should be available, visible, and accessible across sectors, demographics, and geography. A successful ecosystem necessitates leadership, consisting of a strong group of entrepreneurs who are visible, accessible and committed to the region being a great place to start and grow a company. It also requires many well-respected mentors and advisors giving back across all stages, sectors, demographics, and geographies as well as a solid presence of effective and well-integrated accelerators and incubators (i.e. intermediaries). In addition, professional services (legal, accounting, real estate, insurance, consulting) that specialize in the unique needs of startups and scale-ups and appropriately priced (such as offering equity-for-service arrangements). For an ecosystem to be successful, large established organizations should also be supportive. This includes large anchor firms, which should create specific departments and programs to encourage cooperation with high-growth start-ups, and it also includes strong government support for and understanding of start-ups to economic growth. Additionally, supportive policies should be in place covering economic development, tax, and investment vehicles. Another prerequisite is a large number of events for entrepreneurs and community to connect and engage, with highly visible and authentic participants (e.g. meet-ups, pitch days, startup weekends, boot camps, hackatons, and competitions). Finally, a thriving ecosystems is said to depend on a deep, well-connected community of start-ups and entrepreneurs along with engaged and visible investors, advisors, mentors and supporters (indicated by high network density). Optimally, these people and organizations cut across sectors and demographics. Everyone must be willing to give back to his community.

Isenberg (2010) also discusses the concept of the entrepreneurial ecosystem. He notes that there is no exact formula for the creation of such an ecosystem but that (public) leaders should follow nine principles when building an entrepreneurial ecosystem. These principles first emphasize the role of local conditions and bottom-up processes: (1) stop emulating Silicon Valley; (2) shape the ecosystem around local conditions; (3) engage the private sector from the start; (4) stress the roots of new ventures; (5) don't over engineer clusters; help them grow organically. Second, they emphasize ambitious entrepreneurship: (6) favor the high potentials; (7) get a big win on the board. And third, focus on institutions: (8) tackle cultural change head-on; (9) reform legal, bureaucratic, and regulatory frameworks). These principles are claimed to lead to 'venture creation', the 'creation of an ecosystem', and a 'vibrant business sector' (Isenberg, 2010). It is unclear how the causal mechanisms work to realize these different results. Even though this might be a practitioner's point of view, the emphasis on the role of local conditions and bottom-up processes is largely in line with recent

academic work on regional innovation and growth (cf. Boschma & Martin, 2010; Cooke et al., 2011), while the focus on ambitious entrepreneurship and institutions is also a key feature of recent entrepreneurship research (Henrekson & Johansson, 2009; Stam et al., 2012; Acs et al., 2014).

Based on this, Isenberg (2011) formulates six distinct domains of the ecosystem: policy, finance, culture, support, human capital and markets. This largely overlaps with the previously mentioned nine attributes and the eight pillars distinguished by the World Economic Forum (2013: 6-7) for a successful ecosystem, each with a number of components. These pillars also focus on the presence of key factors (resources) like human capital, finance, and services; the actors involved in this (talent, investors, mentors / advisors, entrepreneurial peers); the formal ('government & regulatory framework') and informal institutions ('cultural support') enabling entrepreneurship; and finally, access to customers in domestic and foreign markets.

The listed attributes, principles, and pillars show that the entrepreneurial ecosystem approach contains a shift of traditional economic thinking about businesses, and especially on markets and market failure, to a new economic view on people, networks and institutions. The common denominator appears to be the fact that entrepreneurs create new value, organized by a wide variety of governance modes, enabled and confined within a specific institutional context. This does not mean that companies and markets (and market failure) are irrelevant. But markets and companies are governance modes which, like all other forms of governance, will always be imperfect. Moreover, entrepreneurship is often about companies and markets "in the making", and not about situations that come close to a 'fully efficient market equilibrium', as in the ideal of the market failure approach.

Drawing on these studies, Spigel (2015: 2) defines entrepreneurial ecosystems as 'combinations of social, political, economic, and cultural elements within a region that support the development and growth of innovative startups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures'. He groups these attributes into three categories - cultural, social, and material - that explain the level of entrepreneurial activity as the output of entrepreneurial ecosystems: cultural attributes (supportive culture and histories of entrepreneurship), social attributes (worker talent, investment capital, networks, mentors and role models), and material attributes (policy and governance, universities, support services, physical infrastructure, open markets). Importantly, these categories of attributes are not isolated from one another but are created and reproduced through their interrelationships. For example, networking programs sponsored by a regional government (a material attribute) depends on the pre-existence of existing knowledge sharing networks within the region to build on (a social attribute), which in turn requires the effort of business networking and knowledge sharing to be legitimized within the local culture (cultural attribute). But while the operation of the program depends on these social and cultural attributes, it also strengthens and reproduces them by helping to create new successful new ventures who see networking with other entrepreneurs as a normal business activity. This relationship is illustrated in Figure 1.

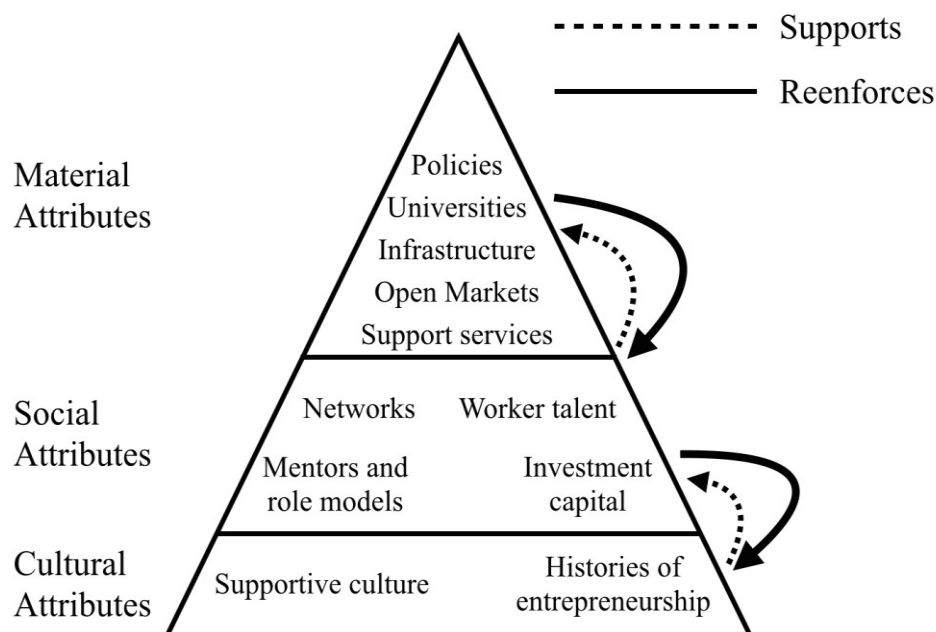


Figure 1. Relationships between attributes within entrepreneurial ecosystems (Spigel, 2015)

5. Shortcomings of the entrepreneurial ecosystem approach

The mere popularity of the entrepreneurial ecosystem approach is no guarantee of its profundity. Seductive though the entrepreneurial ecosystem concept is, there is much about it that is problematic and the rush to employ the entrepreneurial ecosystem approach has run ahead of answering many fundamental conceptual, theoretical and empirical questions. The phenomenon at first appears rather tautological: entrepreneurial ecosystems are systems that produce successful entrepreneurship, and where there is a lot of successful entrepreneurship there is apparently a good entrepreneurial ecosystem. Such tautological reasoning ultimately offers little insight for research or public policy. Secondly, the approach as yet provides only long laundry lists of relevant factors without a clear reasoning of cause and effect nor how they are tied to specific place-based histories. These factors do provide some focus but they offer no consistent explanation of their coherence or their interdependent effects on entrepreneurship - and, ultimately, on aggregate welfare. And third, it is not clear which level of analysis this approach is targeting. Geographically, it could be a city, a region or a country. It can also be other systems less strictly defined in space, such as sectors or corporations, which create opportunities for firm creation and growth.

Such approaches do not offer sufficient explanations for economic outcomes and has not been clearly demarcated. Nor do they provide useful insights into the fundamental causes of the entrepreneurial ecosystems. The World Economic Forum (2013) study, for example, concludes that access to markets, human capital and finance are most important for the growth of entrepreneurial companies. But these can best be seen as superficial perquisites, not as the fundamental causes for the success of ecosystems - for human resources and finance are, after all, largely dependent on the underlying institutions regarding education and financial markets (Acemoglu et al., 2005). For an adequate explanation we must distinguish between the necessary and contingent conditions of an ecosystem and clearly define the role of the government and other public organizations. This has not yet been accomplished. The question remains: how do entrepreneurial ecosystems perform with the different forms of entrepreneurship (as output) and in terms of aggregate welfare effects (as final outcome)? After more elaboration, the tautology will probably disappear. Constructive synthesis of on the one hand the previously mentioned elements of the entrepreneurial ecosystem approach, and on the other hand the insights from the existing empirical studies on entrepreneurship and (regional)

economic development (Stam and Bosma, 2015a; Fritsch, 2013) could provide a better framework for policy.

The question of the level at which entrepreneurial ecosystem operate has not been answered yet. This would depend on the spatial scale on which the elements are achieved, on the one hand, and how they are limited, on the other hand. For most system elements it seems possible to demarcate them at a regional (sub-national) level (e.g. regional labour markets), while the conditions can be designed on both regional and national level (e.g. national laws and regulations) (cf. Stam and Bosma, 2015b). In addition, entrepreneurs of high-growth firms and especially entrepreneurial employees in large established firms could act as ecosystem connectors on a global scale, connecting distinct regional entrepreneurial ecosystems in their role as knowledge integrators (Sternberg, 2007; Malecki, 2011).

6. An entrepreneurial ecosystem model

In response to these critiques we have developed a new entrepreneurial ecosystem model, as shown in Figure 2. The new model includes insights from the previous literature (i.e. the aspects that have been deemed important elements of entrepreneurial ecosystems), but most importantly it provides more causal depth with four ontological layers (framework conditions, systemic conditions, outputs, and outcomes), including the upward and downward causation, and intra-layer causal relations. Upward causation reveals how the fundamental causes of new value creation are mediated by intermediate causes, while downward causation shows how outcomes and outputs of the system over time also feed back into the system conditions. Intra-layer causal relations refer to the interaction of the different elements within the ecosystem, and how the different outputs and outcomes of the ecosystem might interact.

The elements of the entrepreneurial ecosystem that can be distinguished are framework conditions and systemic conditions. Both are summarized in Figure 2. The framework conditions include the social (informal and formal institutions) and physical conditions enabling or constraining human interaction. In addition, access to a more or less exogenous demand for new goods and services is also of great importance. This access to buyers of goods and services, however, is likely to be more related to the relative position of the ecosystem than its internal conditions (in contrast to for example the important role of 'home demand' in Porter's [1990] cluster approach). These conditions might be regarded as the fundamental causes of value creation in the entrepreneurial ecosystem. However, in order to fully understand how these fundamental causes lead to this outcome, we first need to gain insight into how systemic conditions lead to entrepreneurial activity.

Systemic conditions are the heart of the ecosystem: networks of entrepreneurs, leadership, finance, talent, knowledge, and support services. The presence of these elements and the interaction between them are crucial for the success of the ecosystem. Networks of entrepreneurs provide an information flow, enabling an effective distribution of knowledge, labour and capital. Leadership provides direction and role models for the entrepreneurial ecosystem. This leadership is critical in building and maintaining a healthy ecosystem. This involves a set of 'visible' entrepreneurial leaders who are committed to the region. Access to financing — preferably provided by investors with entrepreneurial knowledge — is crucial for investments in uncertain entrepreneurial projects with a long-term horizon (see e.g. Kerr & Nanda, 2009). But perhaps the most important element of an effective entrepreneurial ecosystem is the presence of a diverse and skilled group of workers ('talent': see e.g. Acs & Armington, 2004; Lee et al., 2004; Qian et al., 2013). An important source of opportunities for entrepreneurship can be found in knowledge, from both public and private organizations (see e.g. Audretsch & Lehmann, 2005). Finally, the supply of support services by a variety of intermediaries can substantially lower entry barriers for new entrepreneurial projects, and reduce the time to market of innovations (see e.g. Zhang & Li, 2010).

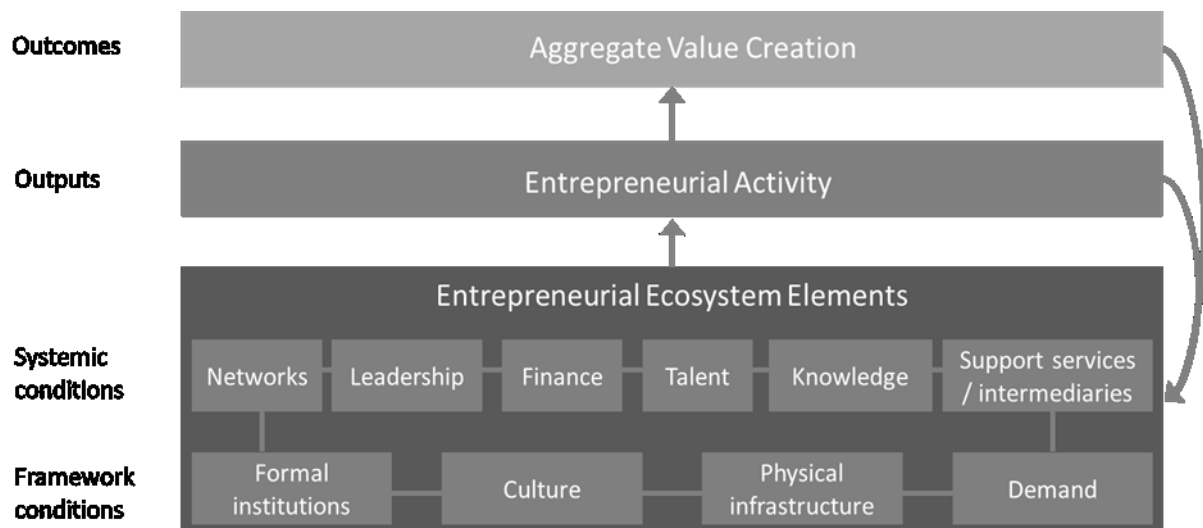


Figure 2. Key elements, outputs and outcomes of the entrepreneurial ecosystem (based on: Stam, 2015)

7. Conclusions and policy implications

The concept of entrepreneurial ecosystems is very attracting to regional policymakers and leaders. The idea that a certain mixture of public policy options, social attitudes, and financing can catalyse long-lasting entrepreneurial and innovation activity is a seductive promise to leaders looking to create a foundation for more sustainable growth. Authors like Feld (2012) are quick to point out that examples like Silicon Valley are not replicable. The growth of places like Silicon Valley are tied directly into particular events (e.g. the founding of Stanford University with an explicitly industrial orientation), historical trends (the US government shifting defence research away from the east coast in the 1930s and 1940s, the emergence of the venture capital industry in the 1950s and 1960s), and the existence of a long-lasting culture that encourages risk taking, rebellion, and innovation throughout the place (Saxenian, 1994; Lécuyer, 2006; Kenney, 2011). Taking one aspect of this complex ecosystem, such as an effective university technology transfer office, will not replicate the other factors, actors, and institutions that make it up.

However, other cases of successful ecosystems offer more reasonable approaches for policymakers. Spigel's (2015) discussion of Waterloo, Ontario is an instructive example of how a mid-sized city can develop a strong and supportive entrepreneurial ecosystem. The city was historically an industrial economy, but the establishment of the University of Waterloo in the 1950s helped move the region towards a more advanced, knowledge-based economy. Crucially, the university has had an applied, industry-focused research orientation from its founding. As the university emerged as a world leading centre for computer science and electrical engineering research, entrepreneurial faculty and students were attracted to the university and the region. This pool of highly skilled workers was instrumental to the creation and growth of Research in Motion, maker of the Blackberry smartphone as well as numerous other smaller high-tech startups. While the region has a highly effective entrepreneurship support organization, its role is secondary to the strong networks of entrepreneurs, mentors, financiers. These networks help new entrepreneurs learn the formal and informal skills associated with being a high-tech entrepreneur and help knowledge about new markets, technologies, and opportunities to flow through the region. This helps to reproduce and strengthen the region's overall cultural orientation towards entrepreneurship, ensuring that it survives the recent decline of local anchor firms like Research in Motion. This effective ecosystem was not created overnight nor through a purposeful effort by the state or an individual. Rather, numerous actors and factors have contributed to creating an ecosystem that supports innovative, high-growth entrepreneurship which in turn has helped the

region avoid the decline and population loss that commonly afflicts old industrial regions in the new knowledge-based economy.

The entrepreneurial ecosystem approach intuitively evokes recognition and acknowledgement among public and private stakeholders of regional economies. A critical review reveals that many insights of decades of research into entrepreneurship and regional development in the past can be used as input to the new approach. It might even be said that the entrepreneurial ecosystem approach contains no new separate insights. However, the entrepreneurial ecosystem approach provides a framework for integration of insights from the academic literature on regional entrepreneurship and the approach includes several valuable novel contributions to our understanding of the entrepreneurship process and its impact on regional economic development. First, the system approach builds up from the level of the entrepreneur in order to better understand the context of the entrepreneurship. Such a system approach also centres on the weakest link that mostly limits the performance of the entrepreneurial ecosystem (Acs et al., 2014). A second novel contribution is the prominent place given to the entrepreneurs themselves to build the entrepreneurial ecosystem and keep it healthy, fed by the other stakeholders relevant to the ecosystem. Although causal relations within the system and the effects on entrepreneurship and value creation have not yet been studied sufficiently, the entrepreneurial ecosystem approach offers valuable elements for an improved understanding of the performance of regional economies. The approach emphasizes interdependencies within the entrepreneurship context, and it provides a bottom-up analysis of the performance of regional economies, without fixating on individual entrepreneurs.

The approach also feeds the shift in entrepreneurship policy from a focus on the quantity to a focus on the quality of entrepreneurship. In line with Thurik et al. (2013), the next shift would be from ‘entrepreneurship policy’ to policy for an ‘entrepreneurial economy’, i.e. an entrepreneurial ecosystem. So policy will not be about maximizing a certain indicator of entrepreneurship, but about creating a context, a system, in which productive entrepreneurship can flourish. This shift also necessitates a shift in thinking about the rationales for policy. The economic policy perspective has been reduced to examining the extent to which markets function optimally, in order to reach the maximum (allocative) efficiency. Or, in policy language: is this a case of market failure? The textbook rationales for government intervention are externalities, abuse of market power, public goods, and asymmetric information. Markets are an important mode of governance in economic systems. In the context of innovation and entrepreneurship, the failure of that mode of governance may also be a reason for government intervention (see e.g. Jacobs and Theeuwes, 2005). Public policy based on insights of the industrial district and cluster approaches also uses the market failure rationale for public policy interventions, such as externalities arising from knowledge spillovers or coordination failures due to information asymmetries. This mode of governance, however, also has substantial constraints for innovation and entrepreneurship policies (Nooteboom & Stam, 2008). Market failure plays a role, but not everything in the innovation system can be reduced to market contexts: the non-market interaction is seen not only as market failure, but often as a necessity for the realization of innovations (Teece, 1992). For innovation and knowledge sharing in general, especially non-codified knowledge, informal interaction is of great importance. Cooperation makes it possible to exchange much more knowledge than can be specified contractually. This was the reason to create a wider framework for this type of policies: the innovation system approach. The focus of this approach is the so-called system failure: the lack of sufficient elements in the innovation system (e.g. certain types of financing or knowledge) or a non-optimal interaction between these elements (e.g. between companies and knowledge institutes). An innovation system works well if there is a sufficient variety of organizations that fulfil the required functions in such an innovation system, and as a result create an optimal interaction between these elements (Nooteboom & Stam, 2008). The innovation system approach not only examines at markets, but also, and especially, organizations and their interaction, and not only through market transactions, but also otherwise. However, in the innovation system approach, the role of entrepreneurs remains a black box, as does the market failure approach, for that matter. This makes the entrepreneurial ecosystem approach more desirable, as it appears to be able to solve the shortcomings of the market failure approach and the system failure approach, and seems better applicable to policies for an entrepreneurial economy.

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